PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : B60N 2/64 — A1

(11) International Publication Number: WO 00/50259

(43) International Publication Date: 31 August 2000 (31.08.00)

(21) International Application Number: PCT/SE00/00356

(22) International Filing Date: 23 February 2000 (23.02.00)

(30) Priority Data:
9900649-6 24 February 1999 (24.02.99) SE

(71) Applicant (*for all designated States except US*): ANDUM HB [SE/SE]; Box 140, S-901 04 Umeå (SE).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): SUNDHOLM, Lars [SE/SE]; Granvägen 8D, S-907 38 Umeå (SE). LINDQUIST, Mats [SE/SE]; Arrendegatan 18, S-462 41 Vänersborg (SE).

(74) Agents: GRIP, Joakim et al.; AB Stockholms Patentbyrå, Zacco & Bruhn, Box 23101, S-104 35 Stockholm (SE).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published

With international search report.

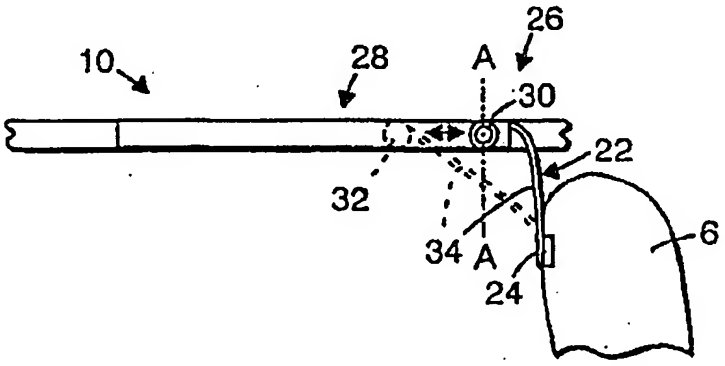
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

In English translation (filed in Swedish).

(54) Title: SEAT FOR A VEHICLE

(57) Abstract

The present invention refers to a vehicle seat with a cushion and a back support, preferably intended for a motor vehicle with a roof to the body. More specifically, it relates to a vehicle seat including a belt (12) for anchoring a person to the vehicle seat where the free ends of the said belt have attachment points (14, 16, 18, 20) arranged at the vehicle seat (2; 60) and comprising a connection means (22, 22') that at a lower end (24; 24') is arranged at the back support (6; 61) and that at an upper end (26; 26') is arranged at a device (28; 28') in the roof (10) of the body, whereby the said connection means (22, 22') has a first attachment point (30; 42) arranged at the said device (28; 28') in the roof of the body that in a normal position is fixed during loadings up to a predetermined value, and which first attachment point (30; 42), during loadings that exceed the said predetermined value, is arranged to be displaced backwards in the roof of the body in relation to the direction of movement of the vehicle to a second attachment point (32; 44). The present invention also includes a method and a use thereof.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

Seat for a vehicle.

Technical field

The present invention relates to a vehicle seat with a cushion and a back support, preferably intended for a motor vehicle with a roof to the body. The present invention also refers to a use thereof and a method for a vehicle seat.

State of the art

The safety demands made on all types of vehicles, but especially motor vehicles, have increased gradually over the years. Today, especially high safety demands are placed on the design and safety performance of the vehicle seat so that this can withstand a forceful collision. This increased safety consciousness has, among other things, also brought with it demands for improved safety belt systems. One improvement that has been achieved is an integration of all of the attachment points for safety belts in the vehicle seat, the so-called "belt-in-seat" concept. As is generally known, cars usually have, among other things, a three point belt where two attachment points are arranged on the floor of the vehicle and where one attachment point is arranged on the so-called B-post in a car. The new concept, with the points for the belt built into the seat, has subsequently received a great deal of attention due to its improved safety performance when compared with a conventional belt system.

Vehicle seats with integrated belt points become, however, relatively expensive as they must fulfil safety demands through the seat design only. They are about three times heavier than conventional seats as one has to dimension the seat sufficiently so that it is strong enough to maintain its construction. As a consequence of this, the seats become relatively large even from a size point of view. The use of this type of vehicle seat has even meant that the floor in the vehicle has to be considerably strengthened as the chassis of the vehicle seat is exposed to and mediates a very large moment on the floor. This is mainly because the upper belt point in the seat back in seats with integrated belt points transfers a large force (up to 10 kN).

A person who has a frontal crash with their vehicle is regarded as a person who moves through space with a certain velocity and this velocity must be slowed down to zero. This occurs through a contact force that is caused to act somewhere on the body. The size of this force depends partly on the initial velocity and partly on the properties of the item that contacts the body. This is clearly the case if the item is completely stationary when the body

comes into contact with it. In a vehicle, it is the interior and the seat belt that supply the body with this force and usually the vehicle has not completely stopped when the body applies its load. In other words, even the reference points of the force retard. The vehicle is slowed down through the frontal structure being deformed and the reduction in velocity takes place through a relatively even deceleration. However, the person in the vehicle does not immediately begin to load the protective system directly, but instead will move forwards in the vehicle an interval without applying a load. The deformation zone in the protective system is naturally much shorter than that of the frontal structure, which is why the deceleration of the person will be about double so large when compared with that of the vehicle. The most optimal situation is if the person and the vehicle are one and the same, i.e. the person sits as mounted in the vehicle body. In that case, the person would experience the same deceleration as the vehicle. The energy of movement of the person will largely be absorbed through deformation of the frontal structure and possible smaller deformations of the attachment points of the person in the vehicle. In this latter case, the deceleration of the person will be reduced by half and thus also the forces of contact on the body.

The above reasoning can be summarised in that there are primarily two methods for reducing the forces of contact on a body of a person travelling in a vehicle during a collision. Obviously, the risk for injuries decreases when the forces of contact are reduced. The first method means that the interior systems are executed in a manner so that they absorb energy when subjected to loading. Examples of this are the force limiters in the seat belt or so-called collapsible steering columns. The second method means that the body is connected with the vehicle as soon as possible so that the deformation of the frontal structure is utilised to absorb the energy of movement. Examples of this are seat belt tensioners and, to a certain extent, even airbags. This second method is also termed "ride-down" effect. The latter method is without doubt the most effective of the two with regard to limiting the size of the forces of contact and thus the risk for personal injury. This is due to the limited deformation zone that is available for the protective system inside the vehicle.

The problems described above, with large moments in the seat and in the floor of the vehicle, can be improved significantly or eliminated completely, and the so-called "ride-down" effect mentioned above can be increased through the seat being anchored to the roof of the vehicle. This gives an increased distribution of the forces to which the seat is exposed. Anchoring the seat back of a vehicle seat to the roof of a vehicle is certainly known previously, but hitherto known designs have a number of disadvantages. In that respect, it has been suggested that the seat back can be anchored to the roof by means of a band or rod

to a permanently anchored attached point in the roof that is not displaced during a collision. This means, however, that the seat back has a certain predetermined angle of approach to the roof that is not optimal for accommodating forces during a collision. Known designs are also bulky in their design and hinder vision both backwards and forwards.

A vehicle seat that is joined with the roof through a telescopic pole is known from DE-C2-19528308. The position of the seat is adjustable through the seat being arranged on rails in the roof and floor. The position of the seat is fixed in that a telescopic pole is locked firmly in the desired position to the roof rail by means of a mechanism. The design according to DE-C2-19528308 does not specify a solution to the problems that have been stated according to the above prior art.

In addition, a vehicle seat with an adjustable back support is known through SE-B-422432, which describes a safety band arranged at the roof of the vehicle body. The free ends of the safety band are attached in the rear respective front sections of the roof body and are joined to the back support. The safety bands run freely and are displaceable through a band guide arranged on the back support. During retardation of the vehicle, automatic locking of the back support to the safety band occurs. SE-B-422432 describes a device for absorbing energy and does not specify a solution to the problems according to the prior art described above.

Summary of the invention

The present invention aims to achieve a vehicle seat with integrated attachment points for a safety belt that is lighter, has a neater construction, is smaller in size, and is cheaper than conventional designs and that eliminates other disadvantages according to the prior art. The aim of the invention is to improve the force accommodating properties and to largely neutralise the large moments that normally arise in the seat and the floor.

The solution is achieved with a vehicle seat with the characteristics stated in claim 1. More specifically, claim 1 according to the present invention refers to a vehicle seat with a cushion and a back support, preferably intended for a motor vehicle with a roof to the body, comprising a belt for anchoring a person to the vehicle seat where the free ends of the said belt have attachment points arranged at the vehicle seat and comprising a connection means that at a lower end is arranged at the back support and that an upper end is arranged at a device in the roof of the body, whereby the said connection means has a first attachment point arranged at the said device in the roof of the body that in a normal position is fixed during loadings up to a predetermined value, and which first attachment point, during

loadings that exceed the said predetermined value, is arranged to be displaced backwards in the roof of the body in relation to the direction of movement of the vehicle to a second attachment point.

One advantage of this solution is that the angle of approach of the back support in relation to the roof is more favourable for accommodating forces when the attachment point is displaced backwards during a collision. The so-called ''ride-down'' effect is improved. An additional advantage is that a relatively lightweight design is obtained. Furthermore, the vehicle seat can be made in a cost-effective, smaller and neater construction than previously.

The present invention also comprises, according to one embodiment, a vehicle seat with a cushion and a back support, preferably intended for a motor vehicle with a roof to the body, comprising a belt for anchoring a person to the vehicle seat where the free ends of the said belt have attachment points arranged at the vehicle seat and comprising a connection means that at a lower end is arranged at the back support and that at an upper end is arranged at a device in the roof of the body, whereby the said connection means has a first attachment point arranged at the said device in the roof of the body, and that the said belt is a four-point belt that comprises two separate partial belts arranged on the respective side and along the respective edge of the back support and intended to be connected together when anchoring a person to the vehicle seat where each partial belt has at its respective upper free end an attachment point on the upper section of the back support and where the respective lower free end of the respective partial belt is arranged at the lower section of the vehicle seat.

The present invention also comprises, according to one embodiment, a vehicle seat with a cushion and a back support, preferably intended for a motor vehicle with a roof, comprising a belt for anchoring a person to the vehicle seat where the free ends of the said belt have attachment points arranged at the vehicle seat and comprising a connection means that at a lower end is arranged at the back support and that at an upper end is arranged at a device in the roof of the body, whereby the said connection means has a first attachment point arranged at the said device in the roof of the body, and that the said back support is designed with a tapered mid-section on either side of the back support and where an airbag is arranged in at least one of the said mid-sections.

The present invention also comprises a method for a vehicle seat with a cushion and a back support, preferably intended for a motor vehicle with a roof, comprising a belt for anchoring a person to the vehicle seat where the free ends of the said belt have

attachment points arranged at the vehicle seat and comprising a connection means that at a lower end is arranged at the back support and that at an upper end is arranged at a device in the roof of the body, whereby the said connection means has a first attachment point arranged at the said device in the roof of the body that in a normal position is fixed during loadings up to a predetermined value, and which first attachment point, during loadings that exceed the said predetermined value, is arranged to be displaced backwards in the roof of the body in relation to the direction of movement of the vehicle to a second attachment point.

The present invention also comprises a use of the said connection means with a first attachment point and a second attachment point according to the device or method for a motor vehicle named above.

Description of the drawings

The invention is now described in more detail in the form of a non-limiting embodiment according to the present invention, clarified with the help of the enclosed drawings, where

Fig. 1a shows schematically a cross-section of a side view of a car.

Fig. 1b shows a partially sectioned outline drawing illustrating a device for displacing the attachment point in the roof of the body.

Fig. 1c shows a partially sectioned cross-section through the device according to Fig. 1b along the line A-A.

Fig. 1d shows a sectioned cross-section through an alternative embodiment of the device according to Fig. 1c.

Fig. 1e shows a longitudinal section of the device according to Fig. 1d.

Fig. 2a illustrates in a partially sectioned outline drawing, an alternative device for displacing the attachment point in the roof of the body.

Fig. 2b shows a vehicle seat with a tapered mid-section on either side of the back support.

Fig. 3 illustrates schematically the principle of the favourable interplay of forces according to the present invention.

Fig. 4 shows in a diagram the favourable and unfavourable force pathways characteristic for belt forces.

Description of preferred embodiments

Fig. 1a shows a vehicle 1, here a car, with one or more vehicle seats 2, each comprising a cushion 4 and a back support 6. The vehicle has a roof 10 to the body. The vehicle seat 2 comprising a belt integrated with the vehicle seat for anchoring a person to the vehicle seat. In addition, the vehicle seat 2 comprises, as is described in more detail below with reference to Fig. 1b and 2a, a connection means 22, 22′ that at its lower end 24, 24′ is arranged at the back support 6 and that at its upper end 26, 26′ is arranged at a device 28, 28′ in the roof of the body 10. The device 28 28′ can suitably be glued to the inside of the roof, which lends extra strength to the design. It is also evident from Fig. 1b that the said connection means 22, 22′ has a first attachment point 30, 42 arranged in the said device 28 28′ in the roof that in a normal position is fixed during loadings up to a predetermined value.

Fig. 1b is an outline diagram illustrating an arrangement for displacing the attachment point 30, 32 in the roof 10. A connecting means 22 is arranged at its lower end 24 at the back support 6 and at an upper end 26 at device 28 in the roof 10. As is illustrated in Fig. 1b, the said connecting means 22 can be a wire or a system of wires that comprises several wires. At the upper end 26, wire 34 is suitably attached to a reel or the like arranged at an attachment point 30, 32 in device 28. The wire can be run off and onto the reel, which adjusts the extension of the wire. During a collision, the reel, and therefore the wire wound on it, is locked in a non-rotating position. It is preferable that a wire system according to the present invention is arranged at an intelligent tensioning system, which is also connected with the seat, and that adapts to the speed of collision and the weight of the person in the seat. Fig. 1c shows, in a partially sectioned cross section A-A in Fig. 1b, wire 34 wound onto a reel 35 arranged at a position for a first attachment point 30 where the reel runs in a groove in the said device 28 in the roof 10. The first attachment point 30 is arranged so that if the loading applied exceeds the said predetermined value, it is displaced backwards in the roof in relation to the direction of movement of the vehicle to a second attachment point 32. According to a second, not shown embodiment, a reel that adjusts the extension of the wire can instead be mounted in the seat of the vehicle and can thus be arranged at the attachment points 30, 32 in the roof only at its second free end.

In the seat back, the wire or wire system can be drawn in a tubing system whose upper end is located near the roof when the seat is in its uppermost adjustable position. When the seat back is adjusted to be at right angles to the floor, the uppermost end of this tubing system is close to or alternatively arranged at the roof. This tubing system can thus lead the wire system so that when the seat is folded forward, the wire will not hinder

access to the rear seat. During a collision, the attachment point is displaced backwards, which causes the wire system to be tensioned and its angle of engagement with the seat back becomes more favourable for accommodating the forces in the seat belt system. When the system is tensioned in this way, even the attachment of the wire system to the upper edge of the back support is bent. This deformation is not possible during normal conditions. The tubing system can in that respect suitably be enclosed within a strong deformable material.

According to one embodiment, the mechanism for displacing the attachment point in the roof can be a spring that is arranged at a reel or the like, where the said spring is arranged in a pre-tensioned manner at the attachment point 30. During a collision situation, the pre-tensioned spring is arranged to release, whereby the reel carries the wire to the second attachment point 32. During this collision situation, even the reel, with the wire wound around it, is locked in a non-rotatable position. The releasing mechanism for displacing the reel and locking the reel can be executed in an appropriate manner well known for a person skilled in the art.

Fig. 1d, in a sectioned cross-section, and Fig. 1e, in a longitudinal section, show an alternative embodiment of the arrangement according to Fig. 1c where a connecting means 134 at its lower end 124 is arranged at a back support of a vehicle seat and at its upper end 126 is arranged at device 128 in the roof 110. The connecting means 134 has a wire running through an opening 133 in device 128 and resting on an axle to reel 135 arranged at an attachment point 130, 132. The connecting means/wire 134 at its upper end 126 is fixed at a so-called tensioner 136 or similar device such as an intelligent tensioning system described above, arranged at the rear end of device 128. The reel runs in a groove in the device 128 and is arranged to be displaced in the longitudinal extension of the object 128. The reel is normally arranged at a first attachment point 130. The tensioner 136 tensions wire 134 in the event of a collision whereby reel 135 is arranged so that when the loading exceeds a pre-determined value, it is displaced backwards in the roof 110 in relation to the direction of movement of the vehicle to a second attachment point 132. The upper end 126 of the wire is thus fixed while the reel can move in the longitudinal direction the object 128. In the normal case, when the wire is only subjected to insignificant loading, the tensioner 136 and the wire 124 function as a normal seat belt system, i.e. the wire can be extended and tensioned depending on the adjustment of the position of the vehicle seat. In this way, the exact positions of the respective attachment points 130, 132 will thus vary somewhat in the longitudinal direction of device 128.

The vehicle seat can suitably be designed with a moveable headrest that is activated and supports the head during the whole process of the collision. In a collision, even the wire system can activate the headrest. This means that the headrest follows the movement of the head forwards in a collision and subsequently gathers up the head, following which, the head has a gentle movement backwards.

An alternative embodiment for a device for displacing the attachment point in the roof is illustrated in Fig. 2a. In this embodiment, a connecting means 22′ is arranged at its lower end 24′ at the back support 6′ and at its upper end 26′ is arranged at device 28′ in the roof 10. In fig. 2a, the said connecting means 22′ and device 28′ include guides-rails 38, 45. A rod 36 can in this respect be arranged at the back support 6′ whereby rod 36 is connected together with a first rail 38. Rod 36 and the first rail 38 are joined together to pivot at a joint 37 and are therefore rotatable in relation to one another. The first rail 38 is displaceable in a firmly attached second guide rail 45, which is suitably glued to the roof. The first rail 38 and the second guide rail 45 can be designed with complementary grooves that are designed to fit one another, in which the guide rails can be displaced relative to one another with low friction. The rails can even be arranged telescopically in one another so that, for example, the first rail 38 is telescopically displaceable in guide rail 45. The said first rail 38 has a first attachment point 42 arranged at the said guide rail 45 in the roof, which attachment point 42 in a normal position is fixed during loading up to a predetermined value. The attachment point 42 is arranged so that when the loading exceeds the said predetermined value, during, for example, a collision or other forceful retardation, it is displaced backwards in the roof in relation to the direction of movement of the vehicle to a second attachment point 44. A non-shown mechanism for displacing the attachment point backwards can be initiated by, for example, a pyrotechnic charge. The mechanism can even constitute, for example, a pre-tensioned spring that is freed during release in a crash situation. When the vehicle is stationary, the back support 6′ can even be tilted forwards to a position 6′′, as is evident from Fig. 2a, to allow, for example, access for a passenger or just for adjusting the angle of the back support to a normal position. This means that the first rail 38 has a third attachment point 46. One advantage of this alternate embodiment according to the present invention (such as described with reference to Fig. 2a and even with the embodiment shown in Fig. 1b), i.e. with displaceable attachment points in the roof, is that the construction design in the roof can be accomplished on a limited part of the inner surface of the roof. This means that a vehicle seat according to the present invention can be placed both in the front and the back of a car.

Fig. 2b shows an alternative vehicle seat 60 comprising a back support 61 with a tapered mid-section 62 on either side and with a seat cushion 63. Vehicle seat 60 includes a belt 12 for anchoring a person to the seat where the free ends of the said belt have attachment points 14, 16, 18, and 20 arranged on seat 60. In addition, seat 60 comprising a connecting means 64, e.g. a tubing system that at a lower end is arranged at the back support 61 and that at an upper end is arranged at a device in the roof. Belt 12 can be a four-point belt that includes two separate partial belts 39, 40 arranged on respective sides 41, 41´ along the edge 43 of the back support 61 and intended to be connected together with a buckle 47 when anchoring a person to the seat, where each partial belt 39, 40 at its upper free end has respective attachment points 14, 16 on the upper part 48 of the back support and where the lower free ends of partial belts 39, 40 are arranged at attachment points at the lower part 50 of back support 61. One advantage of this solution is that the attachments of the belts come closer to the body of the person in the seat, which gives a better fit of the belt to the body irrespective of the size of the person.

According to an alternative embodiment, an airbag can be arranged in at least one of the mid-sections (62), see Fig. 2b. One advantage of this is that during a side-collision, the air bag has a somewhat longer time to inflate to protect the passengers. One problem with known airbags arranged at the side of the vehicle body is actually that the time available is not sufficient for the airbag to inflate during a collision from the side. According to yet another embodiment, the belt in the upper section 48 of the back support at the said attachment points 14, 16 can be arranged to pivot whereby respective partial belts 39, 40 can be rotated, suitably by up to 90°, from a position along the edge 43 of the back support to a position towards the centre 66 of the back support for anchoring a person in the seat.

The present invention is focused on increasing the so-called "ride-down" effect and is not focused on absorbing energy in the protective system. Fig. 3 shows the favourable interplay of forces when utilising the "ride-down" effect. Fig. 3 shows as an outline drawing a vehicle seat including a seat back 72 that at its upper part has an attachment point 76 for a belt and a wire, alternately a connecting means such as a rod or the like. As Fig. 3 illustrates, the attachment 74 of the wire/connecting means is displaced backwards in the roof 70 of the vehicle in the event of a collision. The interplay of forces in the seat 72 thus becomes optimal from this point of view. As Fig. 3 shows, the belt force 78 is transferred directly up to the attachment point 74 in the roof via the wire force 80.

The most optimal characteristic of the belt force, if the "ride-down" effect is sought after, is evident from Fig. 4, which in diagram form shows favourable and non-

favourable force pathways characteristic for seat belt forces. The diagram shows path X as a function of force Y. Curve P_1 describes a favourable force path characteristic, while curve P_2 describes a non-favourable force path characteristic.

To construct a so-called "belt-in-seat" seat (i.e. where every belt point is integrated into the seat according to the present invention) without attachment in the roof demands a very robust construction if one wants to avoid the back, and the attachment points for the belt with it, moving forward during loading. By leading the belt force directly up into the roof, it will be purely dependent on the deformation properties of the wire and its attachment points. Through an extension of the wire or similar connection means according to the present invention (i.e. a displacement backwards of the attachment point for the wire at the moment of collision,) the wire/connection means is stretched so that it can provide a high force of reaction without any great deformation. As is, for instance, known previously, placing the attachment point for wire/connection means directly above the seat would mean that the back support must move forwards an interval before a force of reaction can be built up. The present invention refers to primarily utilising the "ride-down" effect, whereby no additional devices for energy adsorption are needed. It is nevertheless not wholly excluded that the device, methods and use according to the present invention described here can be combined with some form of force limiter (energy accommodation) in the belt.

Claims

1. A vehicle seat (2;60) with a cushion (4;63) and a back support (6;61), preferably intended for a motor vehicle (1) with a roof (10) to the body, comprising a belt (12) for anchoring a person to the vehicle seat where the free ends of the said belt have attachment points (14, 16, 18, 20) arranged at the vehicle seat (2;60) and comprising a connection means (22,22′) that at a lower end (24) is arranged at the back support (6;61) and that at an upper end (26;26′) is arranged at a device (28;28′) in the roof (10) of the body characterised in that the said connection means (22,22′) has a first attachment point (30;42) arranged at the said device (28;28′) in the roof of the body that in a normal position is fixed during loadings up to a predetermined value, and which first attachment point (30;42), during loadings that exceed the said predetermined value, is arranged to be displaced backwards in the roof of the body in relation to the direction of movement of the vehicle to a second attachment point (32;44).

2. Vehicle seat according to claim 1 characterised in that the said connecting means is at least one wire (34).

3. Vehicle seat according to claim 1 characterised in that the said connecting means (22′) and device (28′) comprises guides-rails (38, 45).

4. Vehicle seat according to claim 1 characterised in that the said belt (12) is a four-point belt that includes two separate partial belts (39, 40) arranged on a respective side (41, 41′) along the respective edge (43, 43′) of the back support (6) intended to be connected together when anchoring a person to the seat, where each partial belt (39, 40) at its respective upper free end has an attachment point (14, 16) on the upper part (48) of the back support and where the respective lower free end of the respective partial belt (39, 40) is arranged at the lower part (50) of the vehicle seat.

5. Vehicle seat according to claim 4 characterised in that the said back support (6) is designed with a tapered mid-section (62) designed on either side (41, 41′) of the back support.

6. Vehicle seat according to claim 4 characterised in that the belt in the upper section of the back support at the said attachment points is arranged to pivot whereby the respective partial belt (39, 40) can be rotated up to 90° from the arrangement along the edge (43;43′) of the back support to a position towards the centre (66) of the back support when anchoring a person in the vehicle seat.

7. Vehicle seat according to claim 1 characterised in that the said back support (6,61) is designed with a tapered mid-section (62) designed on either side (41, 41′)

of the back support, and where an airbag is arranged in at least one of the said mid-sections (62).

8. A method for a vehicle seat with a cushion (4;63) and a back support (6;61), preferably intended for a motor vehicle (1) with a roof (10) to the body, comprising a belt (12) for anchoring a person to the vehicle seat where the free ends of the said belt have attachment points (14, 16, 18, 20) arranged at the vehicle seat (2;60) and comprising a connection means (22,22´) that at a lower end (24) is arranged at the back support (6;61) and that at an upper end (26;26´) is arranged at a device (28;28´) in the roof (10) of the body characterised in that the said connection means (22,22´) has a first attachment point (30;42) arranged at the said device (28;28´) in the roof of the body that in a normal position is fixed during loadings up to a predetermined value, and which first attachment point (30;42), during loadings that exceed the said predetermined value, is arranged to be displaced backwards in the roof of the body in relation to the direction of movement of the vehicle to a second attachment point (32;44).

9. Use of a connecting means (22; 22´) with a first attachment point (30;42) and a second attachment point (32;44) according to the arrangement in claims 1-7 or the method according to claim 8 for a motor vehicle.

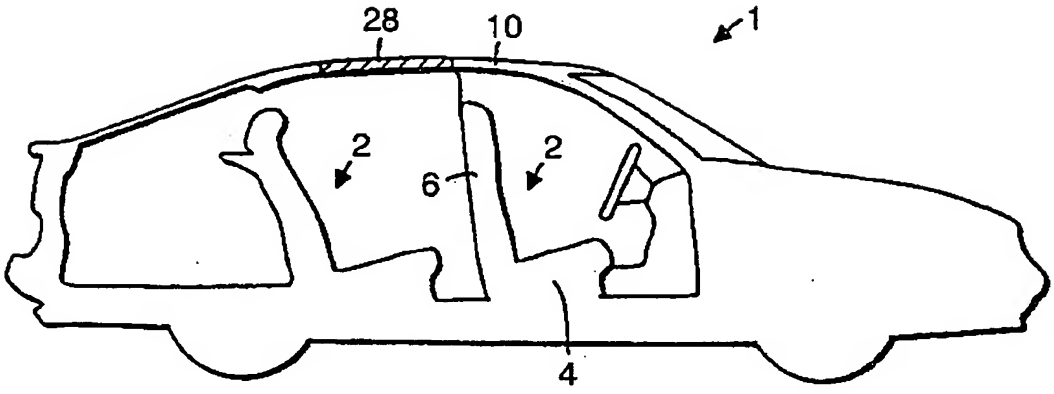


FIG.1a

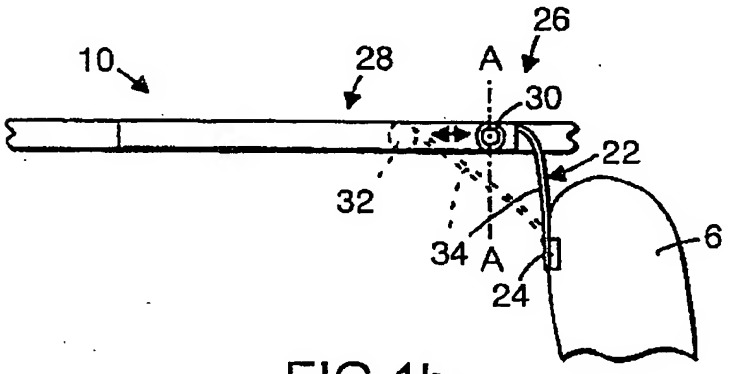


FIG.1b

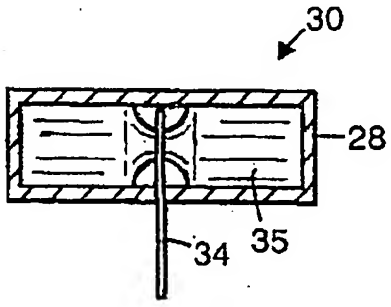


FIG.1c

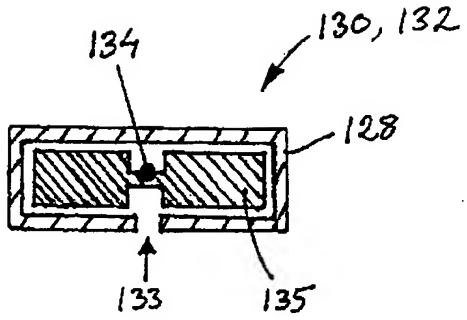


FIG. 1d

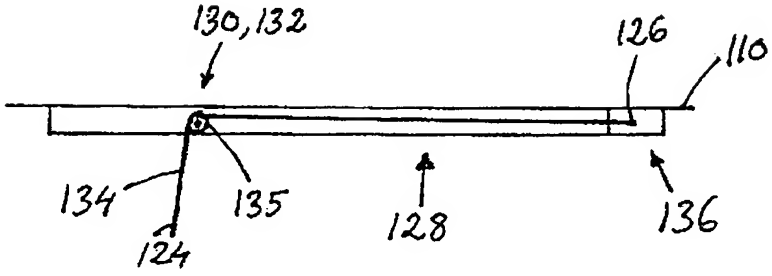


FIG. 1e

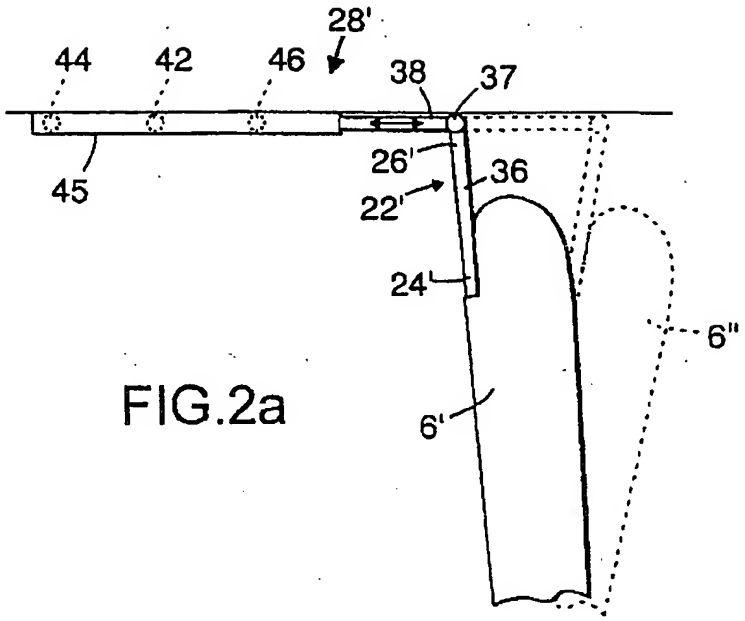


FIG.2a

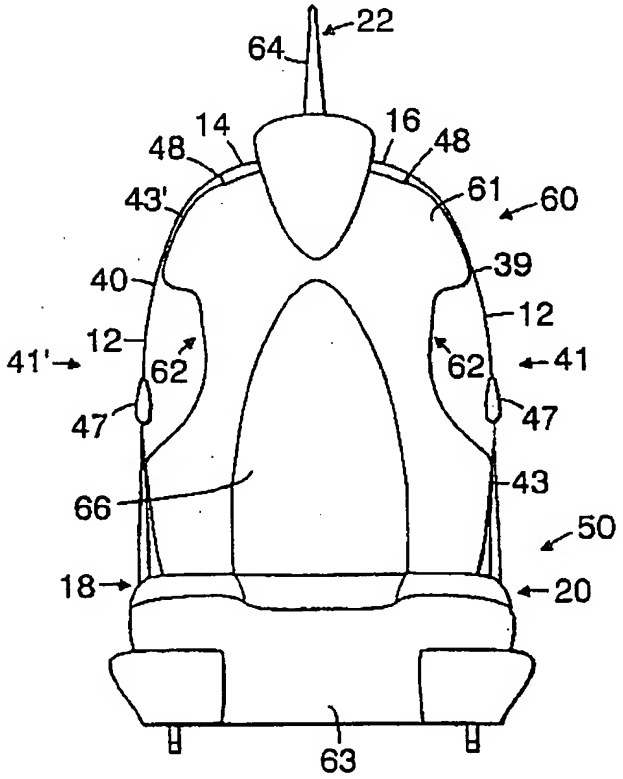


FIG.2b

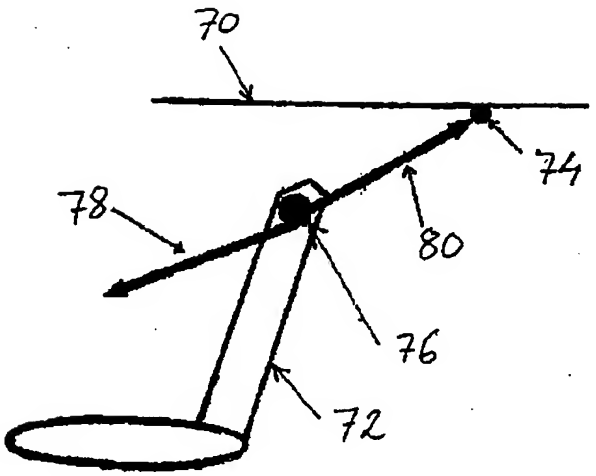


FIG.3

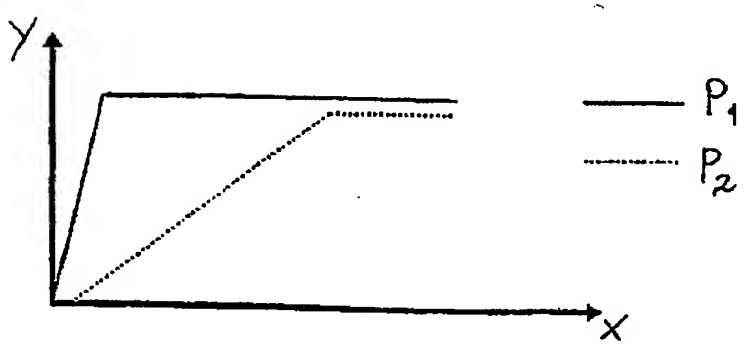


FIG.4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/00356

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B60N 2/64
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SE 422432 B (GENERAL MOTORS CORPORATION), 8 March 1982 (08.03.82), page 2, line 12 - line 20, figure 1	
A	DE 19528308 A1 (MERCEDES-BENZ AKTIENGESELLSCHAFT), 6 February 1997 (06.02.97), figure 1, abstract	
A	DE 3931696 A1 (BAYERISCHE MOTOREN WERKE AG), 4 April 1991 (04.04.91), abstract	

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 May 2000	22 -06- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Dan Ionesco / JA A Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/00356

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 2747398 A1 (LINDBLAD, STIG MARTIN), 3 May 1978 (03.05.78), page 8, line 17 - page 9, line 13, figures 1,2,4 -- US 3922029 A (URAI), 25 November 1975 (25.11.75), abstract -- --------	

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SE 00/00356

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE 422432 B	08/03/82	DE 2308895 A,B,C	05/09/74
		FR 2219029 A,B	20/09/74
DE 19528308 A1	06/02/97	NONE	
DE 3931696 A1	04/04/91	NONE	
DE 2747398 A1	03/05/78	SE 7611740 A	23/04/78
		SE 7614352 A	22/06/78
US 3922029 A	25/11/75	AU 471000 B	18/03/76
		AU 6808174 A	23/10/75
		DE 2418765 A,B,C	31/10/74
		FR 2226299 A,B	15/11/74
		GB 1465957 A	02/03/77
		JP 911177 C	21/06/78
		JP 49128420 A	09/12/74
		JP 52039525 B	05/10/77
		JP 49134365 A	24/12/74